Smart Assessment of the Qualitative Character of the Collective Response to Likert Items in Delphi Reports

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Abstract

Likert scales are commonly used for scaling responses in surveys conducted in a wide variety of fields. They are particularly usual in the context of Delphi studies (see [3]), a widely spread research methodology in which a questionnaire is delivered to a panel of experts in successive rounds, in such a way that, in each round, each expert is allowed to reconsider her/is individual position on each item of the questionnaire by comparing it to the collective response of the panel in the previous round. To this aim, each round's responses are summarized in a report delivered to experts together with the next round's questionnaire. In this context, the automated analysis of responses to a Likert item usually pursues obtaining a quantitative description of the collective position of the panel in terms of central tendency and dispersion measures. Raw distributions of relative frequencies are often discarded for reporting tasks because of lack of elaboration and potential difficulties of interpretation for experts. However, frequency distributions contain much more information than the referred measures, and particularly these lasts are usually unable to determine the qualitative character (consensus, lack of consensus, polarization, etc.) of the collective response to the item, although this kind of qualitative information may be highly valuable for experts in order to reconsider their individual opinions. For this reason, here we propose a method to automatically estimate the qualitative character of a set of responses to a Likert item from its frequency distribution. Formally, our method combines paraconsistent logic (see [4]) and usual goodness-of-fit chi-square statistical testing (see [2]), in such a way that the first is in charge of dealing with the positive/negative character of the Likert responses (in order to assess the polarization of the collective position), while the second is in charge of testing for the uniformity of the responses (in order to assess lack of consensus). Computationally, our method has been implemented in SAS 9.4, and showed quite accurate and useful results when first applied in a Delphi process conducted for studying the integration of diversity in the DNA of British Council. Our method can be seen as a complementary approach to that in [1].

References

1. GALÁN-GARCÍA J.L. AND MERINO S. AND MARTÍNEZ J. AND DE AGUILERA M.. A Genetic Algorithm and an Exact Algorithm for Classifying the Items of a Questionnaire Into Different Competences.. Proceedings of ESCO Conference (2014).
2. GREENWOOD P. E. AND NIKULIN M.S. . A guide to chi-squared testing.. Wiley, New York, NY (1996).
3. LINSTONE H. A. AND TUROFF M. . The Delphi Method. Techniques and Applications.. Addison-Wesley Educational Publishers Inc., Reading, MA (2002).
4. RODRÍGUEZ J. T. AND TURUNEN E. AND RUAN D. AND MONTERO J.. Another paraconsistent algebraic semantics for Lukasiewicz-Pavelka logic.. Fuzzy Sets and Systems 242 (2014) 132-147.